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| **Number Sense** | | |
| **Big ideas:**  In high school, students will be exposed to yet another extension of number, when the real numbers are augmented by the imaginary numbers to form the complex number system.  As with previous number systems learned in earlier grades, this complex system has the commutative, associative, and distributive properties and their new meanings are consistent with their previous meanings.  In high school, students encounter a wider variety of units in modeling, e.g. acceleration, currency conversions, derived quantities such as person-hours and heating degree days, social science rates such as per-capita income, and rates in everyday life such as points scored per game or batting averages. They also encounter novel situations in which they themselves must conceive the attributes of interest. For example, to find a good measure of overall highway safety, they might propose measures such as fatalities per year, fatalities per year per driver, or fatalities per vehicle-mile traveled. Such a conceptual process might be called quantification. Quantification is important for science, as when surface area suddenly “stands out” as an important variable in evaporation. Quantification is also important for companies, which must conceptualize relevant attributes and create or choose suitable measures for them. | | |
| **Main Ideas** | **Insights and Questions** | **Alignment Code[[1]](#footnote-1) Notes** |
| **Real Number System N-RN**: properties of exponents grow to include rational exponents, connections between radical numbers and numbers written with rational exponents.  Abstraction of properties extended to complex numbers including ideas about closure. | **College Readiness Standards** include more about rational numbers which are covered in 8h gr. CCSS. CRS has more emphasis on estimation an computation skills explicitly.  **WA State PEs** include complex numbers in Alg. 2 but only in comparison to other number systems and as possible solutions to polynomial equations.  <http://illustrativemathematics.org/illustrations/385> | 2 – complex numbers |
| **Quantities Q-N:** **Reason quantitatively and use units to solve problems.**  1. Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.  2. Define appropriate quantities for the purpose of descriptive modeling.  Levels of accuracy in measurement | Basically the same as CRS and WA State PEs  Ideas about quantification of real situations, e.g. science  What is meant exactly by modeling? What kind of descriptive modeling is implied?  <http://illustrativemathematics.org/illustrations/84> | 3 |
| **The Complex Number System N-CN:**  1. Extend real number operations and properties to complex numbers  2. Use students’ prior experience solving polynomials to motivate the understanding of complex numbers | Complex numbers are not just roots of quadratic functions. They extend the real number system but have many of the same properties of real numbers.  Complex numbers can be represented algebraically and geometrically. | 2 – main idea #1  1 – main idea #2 |
| **Vector and Matrix Qualities N-VM**  1. Represent, model, operate on, and apply vectors and matrices.  2. Make connections between algebraic and geometric representations of vectors. |  | 1 |
| *Comments:* | | |

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| **Probability and Statistics** | | |
| Big ideas:  Use probability and statistics to summarize and interpret data and then make predictions and decisions based on the analysis | | |
| **Main Ideas** | **Insights and Questions** | **Alignment Code[[2]](#footnote-2) Notes** |
| Summarize, represent, and interpret data – recognize which tools to apply | We wondered where the focus on gathering data was. Found in 7th grade level  <http://www.illustrativemathematics.org/illustrations/216> | 3 (but necessary for anyone in society) |
| Evaluation processes, making inferences & justifying conclusions | Students’ communication level can affect their ability to justify reasoning  <http://www.illustrativemathematics.org/illustrations/186> | 1 |
| **Conditional probability & Rules of Probability** |  | 1 |
| **Using probability to make decisions** | Most standards have a (+) beside them | 1 |
| *Comments:* | | |

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| **Geometry** | | |
| Big ideas:  The course from Appendix A for Geometry keeps the flow of the concepts.  This is a transformational approach to geometry.  The concepts of congruence, similarity, and symmetry can be understood from the perspective of geometric transformation. Fundamental are the rigid motions: translations, rotations, reflections, and combinations.  Analytic geometry connects algebra and geometry, resulting in powerful method of analysis and problem solving. | | |
| **Main Ideas** | **Insights and Questions** | **Alignment Code[[3]](#footnote-3) Notes** |
| **G-CO**  Congruence results from looking at transformations and understanding congruence in terms of rigid motion, prove geometric theorems, and make geometric constructions. | How will constructions be performed in general – will all students be proficient with all methods?  Geometric Constructions are not in the College Readiness Standards. | 3 There is a difference in the way this will be taught to the College Readiness Standards |
| **G-SRT**  Similarity results from looking at congruence and in terms of similarity transformations. Prove Theorems involving similarity. Trigonometry comes from looking at right triangle relationships. | Noticing that the Circle Domain follows the Similarity, Right Triangle and Trigonometry Domain  Similarity, Right Triangles, and Trigonometry are clustered together  Focus on Special Right Triangles is not in the Common Core Standards  <http://www.illustrativemathematics.org/illustrations/607>  general triangles have a (+) | 3 Similarity is not stressed in the College Readiness Standards.  Right triangle focus is also not a current focus in the College Readiness Standards.  2 Apply Trigonometry to General Triangles |
| **G-C**  Similarity of circles results from prior work on similarity. Understand and apply theorems about circles. | Circles should be included with similarity, right triangles, and trigonometry. Think about circles ”transformationally”; what does it mean for all circles to be similar?  Need the trigonometry understanding for the circle.  Most trig function standards have a (+) | 3 Are not in the College Readiness Standards. |
| **G-GPE**  Translate between the geometric description and the equation for conic section and use coordinates to prove simple geometric theorems algebraically. | Only circles and parabolas required for geometry.  Connection between proof and algebraic understanding  <http://www.illustrativemathematics.org/illustrations/605> | GPE 1 3  GPE 2 2 |
| **G-GMD**  Explain volume formulas and use them to solve problems.  Visualize relationships between two dimensional and three dimensional objects. | Back to a more traditional approach to geometry and moves into three dimensional objects. Early experience with formulas makes the high school understanding different. |  |
| **G-MG**  Apply geometric concepts in modeling situations (real-world situations) | Modeling for description of objects, solving density problems and to solve business style design problems(e.g.optimal packaging)  <http://www.illustrativemathematics.org/illustrations/415> |  |
| *Comments:* | | |

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| **Algebra** | | |
| Big ideas: Focus is on understanding the underlying structure of expressions and equations and seeing the parallel structures between equations that have solutions in different systems. | | |
| **Main Ideas** | **Insights and Questions** | **Alignment Code[[4]](#footnote-4) Notes** |
| **Interpret the structure of expressions** | Closely matched with College Readiness Standards  Need to develop expressions and delineate concept of expressions. | 3 Basic Requirement |
| **Write expressions in equivalent forms to solve problems** | Closely matched with College Readiness Standards  Is there a way to teach life skills without developing theory of geometric sequences, without introducing logarithms? | 3 Basic Requirement |
| **Perform arithmetic operations on polynomials** | Closely matched with College Readiness Standards | 3 Basic Requirement |
| **Understand the relationship between zeros and factors of polynomials** | Closely matched with College Readiness Standards | 3 Basic Requirement |
| **Use polynomial identities to solve problems** | Closely matched with College Readiness Standards | 1 Extra Benefit |
| **Rewrite rational expressions** | Closely matched with College Readiness Standards  Where is the discussion describing when is it appropriate to use graphing tool?  When does the discussion include what is going on in the algorithm? | 3 – Basic Requirement  should be able to do the operations with rational expressions  2 – STEM  understand content of rational expressions how it forms additional information to polynomial expressions |
| **Create equations that describe numbers or relationships** | Aligned with College Readiness Standards  Really good modeling!  <http://www.illustrativemathematics.org/illustrations/21> | 3 Basic Requirement |
| **Understand solving equations as a process of reasoning and explain the reasoning** | Aligned with College Readiness Standards | 3 – Basic Requirements |
| **Solve equations and inequalities in one variable** | Aligned with College Readiness Standards | 3 – Basic Requirements |
| **Solve systems of equations** | Aligned with College Readiness Standards  Solving linear and non-linear with algebraic as well as approximating (with tables)  Matrix Operations | 3 – Basic Requirement  1-Extra Benefit |
| **Represent and solve equations and inequalities graphically** | Aligned with College Readiness Standards  Finally absolute value!  Where is the analytical solving of absolute values? | 3 – Basic Requirement |
| *Comments:*  How long a period of time and at what point should these topics be introduced/developed?  What topics are non-negotiable? Which ones can be dropped?  Common Core aligns really well with College Readiness Standards.  Targets more than practice of isolated skills, looking for understanding of structure and connections | | |

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| **Functions** | | |
| Big ideas: Understanding the concept independent of the representation. Functions based in contexts. Multiple representations of functions, modeling in the different representations. Understanding domain and range in multiple representations and multiple contexts. Understanding a function as a relationship with its own characteristics and relationships. | | |
| **Main Ideas** | **Insights and Questions** | **Alignment Code[[5]](#footnote-5) Notes** |
| **Interpreting Functions F-IF:** Understanding the concept of a function; understanding notation of functions in multiple usages; graphical representation; making connections between the multiple representations; interpret features of functions (e.g. max/min) in and out of contexts; practical domain | Time for conceptual and contextual development of functions  Comparing characteristics isn’t in PEs.  Highly comparable to College Readiness Standards. | 3, except rational function which are 2 |
| **Building Functions F-BF:** Model relationships with functions; arithmetic and geometric sequences; Understand and find inverse functions | Not in WA PEs as a focus  We had a debate about whether transformations of functions belong in code 2 or 3.  <http://www.illustrativemathematics.org/illustrations/364>  <http://www.illustrativemathematics.org/illustrations/234> | 2: building models of situations; transformations of graphs  3: composing functions; understanding and finding inverse functions |
| **Linear, Quadratic, and Exponential Models F-LE:** Understand the meanings of linear and exponential functions in terms of differences over equal intervals; knowing when to use which model | Questions: is logarithmic scale included? What is the distinction between F-BF 5 and F-LE 4, and why is only the former denoted with “(+)”. | 3 |
| **Trigonometric Functions F-TF:** Radians; development of trig in function contexts on the domain on real numbers; model period behavior, prove and apply trig identities | Trig functions have a (+) beside them | 2 |
| *Comments:* | | |

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| **Modeling** | | |
| Big ideas: Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. | | |
| **Main Ideas** | **Insights and Questions** | **Alignment Code[[6]](#footnote-6) Notes** |
| 1. Students will become familiar with the multiple ways mathematics can be used to model situations  2. Make connections between the problem situation and the mathematics.  3. Set up and solve problems | The model chosen would depend on the mathematics of the class.  Experiencing modeling makes all the difference in the world for students’ preparedness for college level mathematics.  Recognizing when and how to apply mathematics to solve problems is an essential component of modeling.  Modeling includes graphic, numeric, symbolic, and geometric representations. | 3- all main ideas |
| *Comments:* | | |

1. Include explanatory comments as necessary, especially as noted in code key [↑](#footnote-ref-1)
2. [↑](#footnote-ref-2)
3. [↑](#footnote-ref-3)
4. [↑](#footnote-ref-4)
5. [↑](#footnote-ref-5)
6. [↑](#footnote-ref-6)